REMARKS

In the present Office Action, Claims 1-22, 25-36, 40, and 48-49 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over the combined disclosures of U.S. Patent No. 6,090,689 to Sadana, et al. ("Sadana '689"), U.S. Patent No. 5,534,446 to Tachimori, et al. ("Tachimori, et al.") and U.S. Patent No. 5,930,643 to Sadana, et al. ("Sadana '643").

Applicants submit that they have *unexpectedly* determined that the use of an ambient gas comprising 0 to about 90% oxygen and from about 10 to about 100% of N_2 or a high mobility gas selected from the group consisting of He, Kr, H_2 and mixtures is capable of providing an SOI substrate that contains a superfacial Si-containing layer that has a *substantial reduced number of tile or divot defects* as compared to SOI substrates that are not annealed in either of the claimed gas ambients.

> "One way for a patent applicant to rebut the prima facie case of obviousness is to make a showing of 'unexpected results', i.e., to show that the claimed invention exhibits some property or advantage that a person of ordinary skill in the art would have found surprising or unexpected. The basic principle behind this rule is straightforward—that which would have been surprising to one of ordinary skill in a particular art would have not been obvious." *In re Soni,* 54 F.3d 746, 34 USPQ2d 1684 (Fed. Cir. 1995)

The reduction of divot formation due to applicants' claimed method was unexpected because applicants' claimed annealing atmosphere was considered by those having ordinary skill in the art to effect only the BOX formation. The reduction in tiles and surface divots in the SOI layer is not produced using conventional oxidizing ambient,

which include oxygen or a mixture of oxygen and Ar. Applicants can provide data to support the above statements in the form of an affidavit under 37 C.F.R. §1.132. The affidavit would basically show a substantially reduced number of tile or divot defects in the Si-containing surface when the samples are processed in applicants' claimed ambient O_2, as compared to an annealing ambient comprising O_2 and Ar.

Applicants respectfully submit that the prior art references do not render the claimed methods obvious since none of the applied references teaches or suggests that an SOI substrate including a superficial Si-containing surface having a reduced number of defects and divots can be achieved by choosing the appropriate gas ambient.

Sadana '689 is defective since the applied reference does not teach or suggest a method which includes an annealing step that uses the claimed gas ambients, which applicants have unexpectedly determined provide an *SOI material that has a surface Si-containing layer that has a reduced number of tile or divot defects*. In contrast, Sadana '689 discloses annealing in an oxidizing ambient to provide a continuous buried oxide region below the surface of the device and does not address treatment of the devices surface or the reduction of divots on the SOI surface. Applicants further note that at the time the Sadana '689 patent was filed, one of ordinary skill in the art was not aware of the incidence of divot formation or could have realize that the incidence of divot formation would be reduced using applicants' claimed annealing atmosphere. "The examiner must ascertain what would have been obvious to one having ordinary skill in the art at the time the invention was made." *Environmental Designs, Ltd. v. Union Oil Co.* 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983). Applicants further note that only after Sadana '689 patent was filed did applicant realize the incidence of divot formation

or invent the claimed method for reducing divot formation. Therefore, Sadana '689 fails to teach or suggest the applicants claimed gas ambients, which provide an *SOI material that has a surface Si-containing layer that has a reduced number of tile or divot defects*, as recited in Claim 1.

As stated above, applicants have unexpectedly determined that the use of an ambient gas comprising 0 to about 90% oxygen and from about 10 to about 100% of N_2 or a high mobility gas selected from the group consisting of He, Kr, H_2 and mixtures therefore is capable of providing an SOI substrate that contains a superfacial Si-containing layer that has a substantial reduced number of tile or divot defects as compared to SOI substrates fabricated by annealing in an oxygen ambient or oxygen admixed with Ar.

Tachimori, et al. do not alleviate the above defects in Sadana '689 since the applied secondary reference discloses that similar results, in terms of reduction of defects in the buried oxide layer, can be achieved using annealing ambients such as oxygen or a mixture of oxygen and Ar, He or nitrogen. The fact that the ambients disclosed in Tachimori, et al. are capable of reducing defects in the buried oxide region, does not necessarily mean that the same ambients can be used to improve the surface quality of the Si-containing layer that lays above the buried oxide layer. Indeed, applicants have determined which ambients can be used to provide an SOI substrate having a superfacial Si-containing layer having a reduced number of tile and divot defects.

Applicants respectfully submit that in the disclosure of Tachimori, et al. there is provided different types of annealing ambients that can be used in forming a substantially defect free buried oxide layer. The applied reference however does not provide any

guidance as to which of the annealing ambients may be used for improving the quality of the top Si-containing layer of the SOI substrate. Thus, it would be necessary for one to try the various annealing ambients disclosed in Tachimori, et al. and to determine from that trail which of the various annealing ambients and conditions would perform best for improving the quality of the top Si-containing layer. Hence, in applying the disclosure of Tachimori, et al. the Examiner appears to be invoking the application of an "obvious to try" standard which is improper at law. This standard, as apposite to the present case, has been articulated as follows:

> The admonition that "obvious to try" is not the standard under §103 has been directed mainly at two kinds of errors. In some cases, what would have been "obvious to try" would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful. (citations omitted; emphasis supplied). In re O'Farrel, 853, F2d. 894, 903, 7 USPQ 2d 1763, 1681 (Fed. Cir. 1988).

In examining the present rejection in view of the foregoing case law, it becomes clear that the disclosure of Tachimori, et al. provides absolutely "no direction as to which of many possible choices is likely to be successful" in forming a top Si-containing layer of an SOI material that contains a substantial reduced number of tile and/or divot defects. Indeed, the applied reference is not concerned with providing a high quality top Si-containing layer, but instead its main focus is providing an SOI material that has a high quality buried oxide region. There is absolutely no correlation provided in the disclosure of Tachimori, et al. that process conditions employed in forming a high quality buried oxide region can be used in forming a high quality top Si-containing layer. Applicants can provide data, in the form of an affidavit under 37 C.F.R. §1.132, to further indicate

that the Tachimori, et al. gas ambient including Ar and N_2 will not reduce the incidence of tile defects or divots at the Si-containing surface.

Sadana '643 also does not alleviate the above defects in Sadana '689 since the applied reference also discloses that oxygen alone, or oxygen admixed with any inert gas can be employed in producing the SOI substrate. As such, the '643 patent does not differentiate which gas ambients could be employed to provide an SOI substrate having a superficial Si-containing layer having a reduced number of tile and divots defects. Applicants further note, similar to Sadana '689, that at the time the Sadana '643 patent was filed one of ordinary skill in the art was not aware of the incidence of divot formation or realize that the incidence of divot formation would be reduced by using applicants' claimed annealing atmosphere. Only after Sadana '643 patent was filed did the Applicant realize the incidence of divot formation or invent the claimed method for reducing divot formation. Therefore, Sadana '643 fails to teach or suggest applicants' claimed gas ambients, which provide an *SOI material that has a surface Si-containing layer that has a reduced number of tile or divot defects*, as recited in Claim 1.

Finally, it is not inherent that the number of divot or tile defects formed on the surface of the Si-containing layer can be reduced using the process steps disclosed by the applied references, including Sadana '643, Sadana '689, and Tachimori, et al. The Federal Circuit has held that inherency cannot be based on mere speculation. *See e.g., Continental Can Co. USA, Inc. v. Monsanto Co.*, 848 F.2d 1264, 1269, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991) (inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.") When anticipation is based on inherency of limitations not expressly

disclosed in the assertedly anticipating reference, it must be shown that the undisclosed information was known to be present in the subject matter of the reference. See *Elan Pharmaceuticals, Inc., v. Mayo Foundation for Medical Education and Research*, 304 F.3d 1221, 1228, 64 USPQ2d 1292 (Fed. Cir. 2002) (*citing Continental Can*, 948 F.2d at 1269). The alleged limitation must be necessarily present so that one of ordinary skill would recognize its presence. *Crown Operations International, LTD v. Solutia Inc.*, 289 F.3d 1367, 1377, 62 USPQ2d 1917 (Fed. Cir. 2002). 'The mere fact that a certain thing may result from a given set of circumstances is not sufficient [to establish inherency.]' ... 'That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.'' *In re Rijckaet* 9 F.3d 1534, 28 USPQ2d at 1957.

The court in *Elan Pharmaceuticals v. Mayo Foundation for Medical Education and Research* held that when a rejection is based on inherency of limitations not expressly disclosed in the assertedly anticipating reference, it must be shown that the undisclosed information was known to be present in the subject matter of the reference. See *Elan Pharmaceuticals, Inc., v. Mayo Foundation for Medical Education and Research*, 304 F.3d 1221, 1228, 64 USPQ2d 1292 (Fed. Cir. 2002) (*citing Continental Can*, 948 F.2d at 1269). In *Elan Pharmaceuticals* the claim limitation at issue before the court was, "wherein said polypeptide is processed to ATF-betaAPP in a sufficient amount to be detectable in a brain homogenate of said transgenic rodent". It was undisputed that the applied reference made no reference to the formation of "ATF-betaAPP". The court found that the Examiner's applied references were no more than broad teachings and were not directed to the applicants' claimed limitation. *Id. at* 1228. The referenced prior art was described as merely "an invitation to experiment with no assurances of success"

Id. Finally, the court stated that a general recitation of known procedures does not defeat the novelty of the invention as produced by the applicant.

Similar to the prior art examined in *Elan Pharmaceuticals*, the referenced prior art cited in the present Office Action does not teach or suggest all of the claimed limitations of the invention. More specifically, the referenced prior art fails to teach or suggest an annealing step which is capable of reducing the number of tile or divot defects at a top surface of said superficial Si-containing layer. "Facts asserted to be inherent in the prior art must be shown by evidence from the prior art". In re Dembiczak, 175 F.3d 949, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (criticizing the hindsight syndrome wherein that which only the inventor taught is used against its teacher). Neither, Tachimori, et al. nor the Sadana, et al. references teach or suggest divot defects, as recited in amended Claims 1 and 49.

Additionally, the combined references of Tachimori, et al. and the Sadana, et al. references, similar to the prior art discussed in *Elan Pharmaceuticals*, at most disclose a general recitation of procedures that were not carried out in a manner in which one of ordinary skill in the art would recognize the unexpected advantages in divot defect reduction achieved using applicants' method, recited in amended Claims 1 and 49. Therefore, in light of the holding of *Elan Pharmaceuticals*, applicants' method recited in amended Claims 1 and 49 is not obvious.

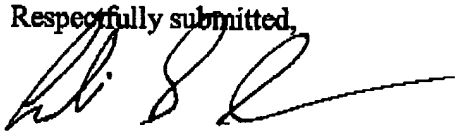
Now referring to new Claim 50. Applicants note that the applied references do not teach or suggest an annealing ambient including a high mobility gas such as H_2 or Ar. Therefore applicants submit that new Claim 50 is not obvious in view of the referenced prior art and is patentable subject matter.

In light of the standard established by the Federal Circuit, applicants respectfully request that the §103 rejection be withdrawn.

Based on the above amendments and remarks the rejection to the claims under 35 U.S.C. §103 have been obviated; therefore reconsideration and withdrawal of the instant rejection are respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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